HOW Reminders

- **Preparedness:**
  - Be in the classroom when the bell rings
  - Have something to write with, a calculator, and your notebook

Engagement:

- Have your phone and computer put away

Warm-Up

Find the vertex, axis of symmetry, and its max/min value.

1) $y = -\frac{1}{4}(x+7)^2 - 1$

vertex: $(-7, -1)$

axis of symmetry: $x = -7$

max at: $y = -1$

2) $2x^2 + 16x + 29$

vertex: $(-4, -3)$

axis of symmetry: $x = -4$

min at: $y = -3$

2.2 Notes – Part 3

Learning Targets:

- I can find the vertex, axis of symmetry, and x-intercepts of a parabola given its equation in intercept form.
- I can graph a parabola given its equation in intercept form.

Discover it

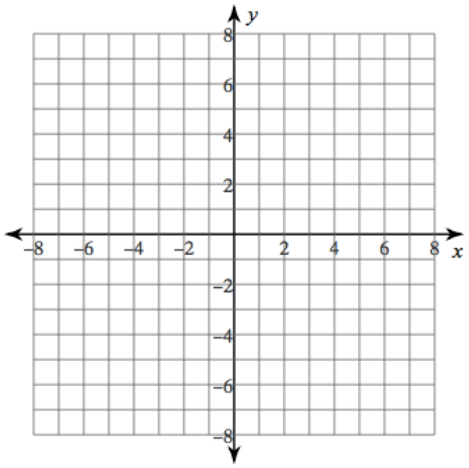
Algebra 2 Name_____

Intercept Form

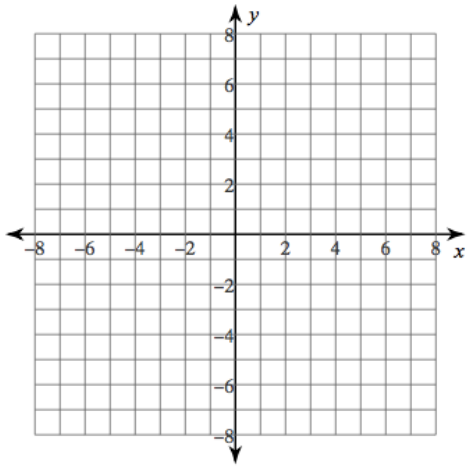
Date_____ Period____

Graph each equation on Desmos. Record your discoveries. :)

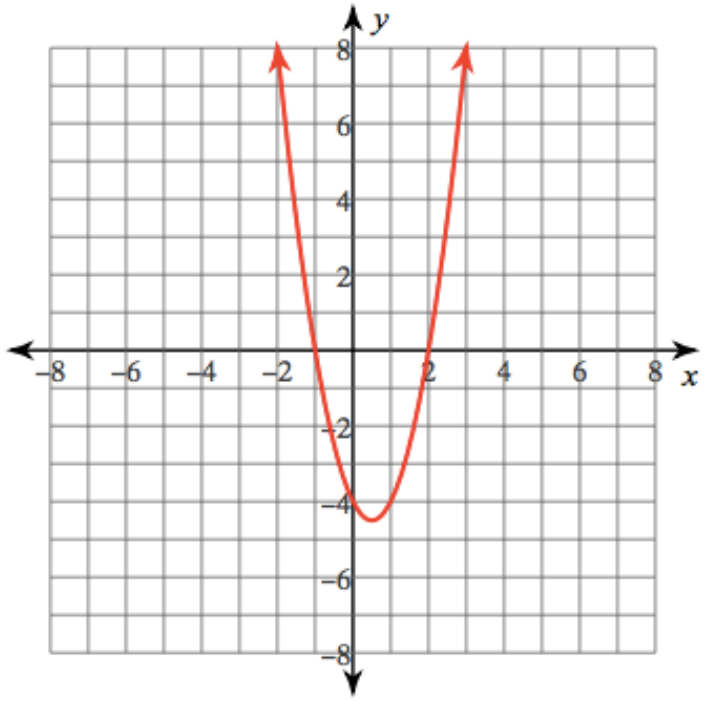
1) $f(x) = 2(x-2)(x+1)$



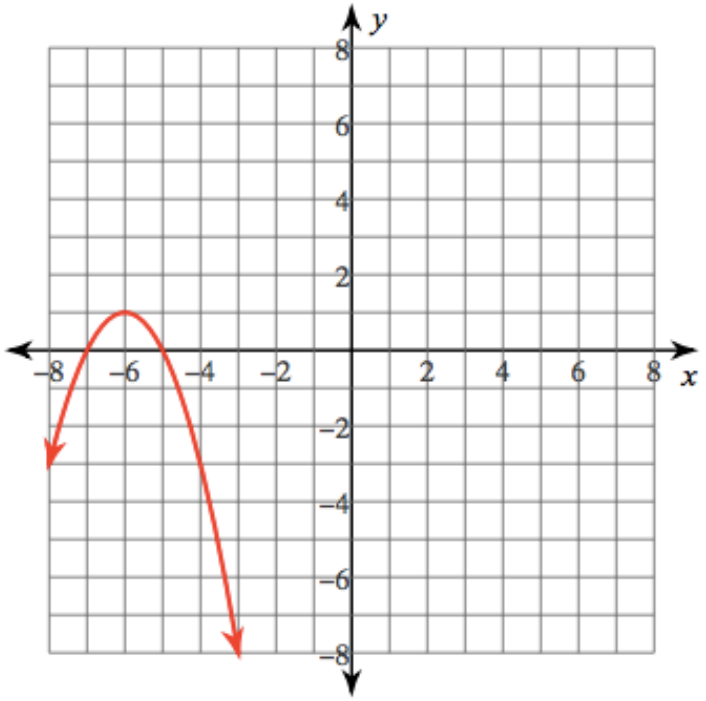
2) $f(x) = -(x+7)(x+5)$



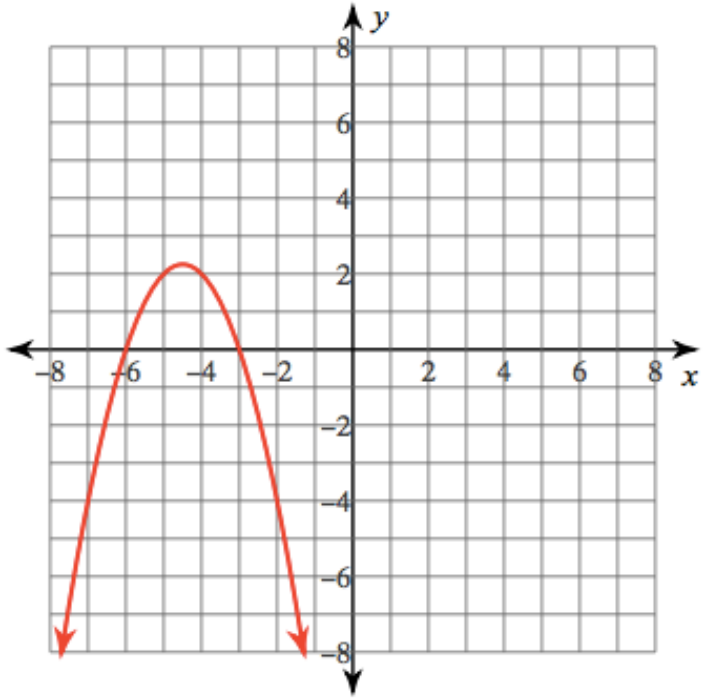
1) $f(x) = 2(x - 2)(x + 1)$



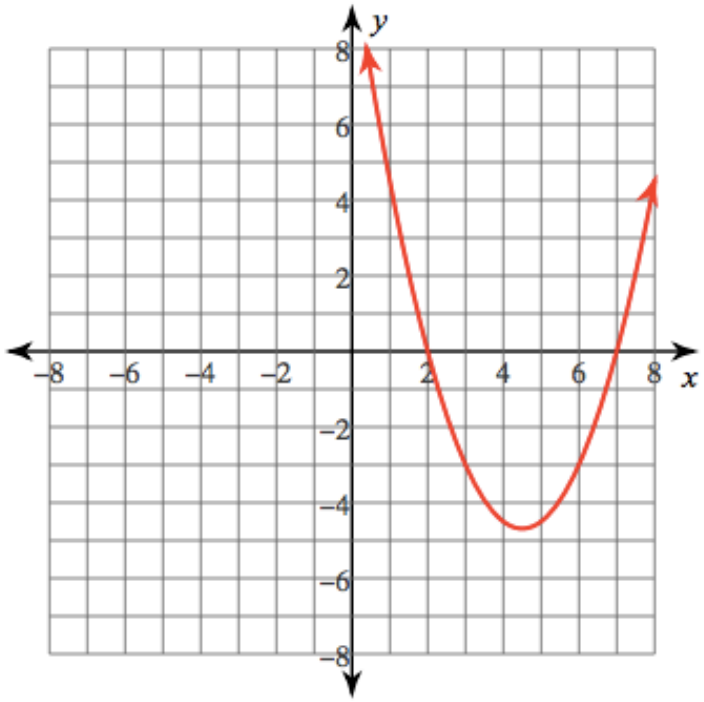
2) $f(x) = -(x + 7)(x + 5)$



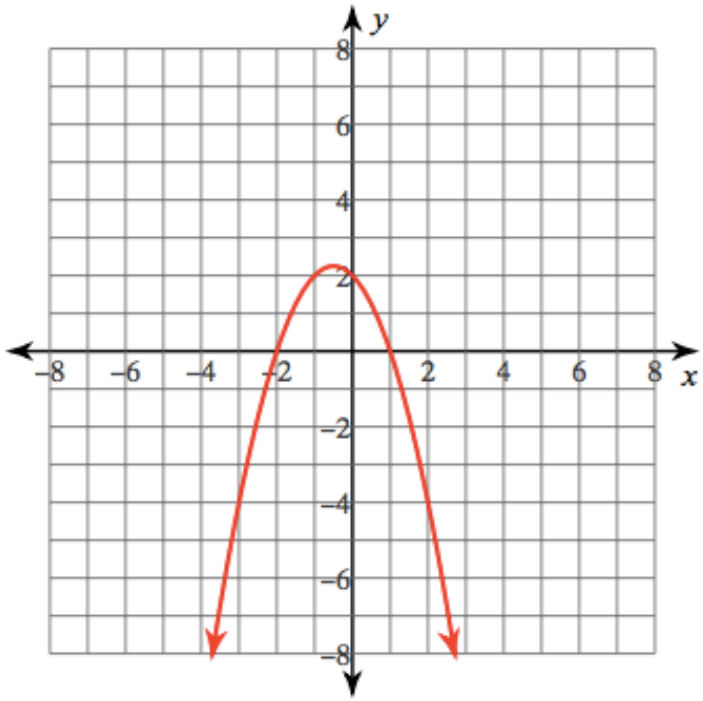
3) $f(x) = -(x + 6)(x + 3)$



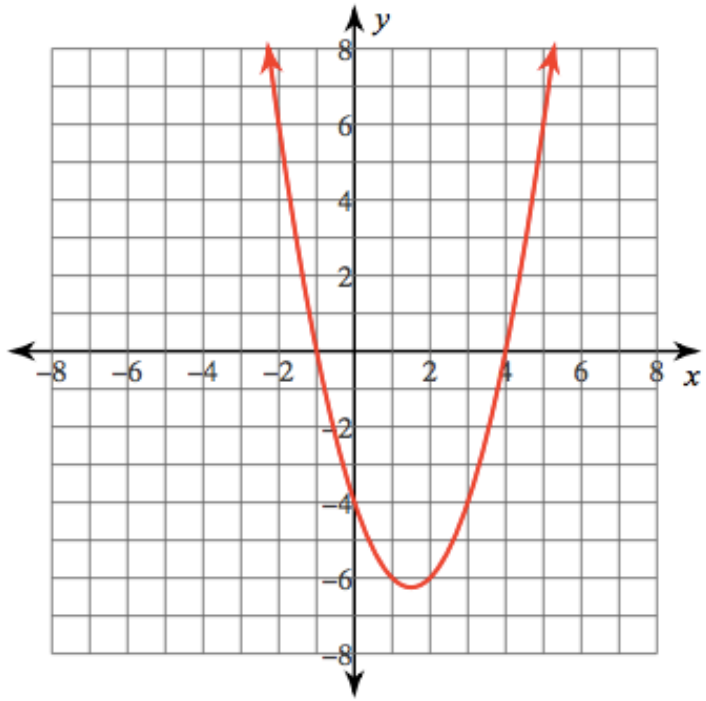
4) $f(x) = \frac{3}{4}(x - 7)(x - 2)$



5) $y = -(x - 1)(x + 2)$



6) $y = (x - 4)(x + 1)$



- **Vertex form**: $f(x) = -a(x-h)^2 + k$
  - vertex: (h, k)
  - axis of symmetry: $x = h$

- **Standard form**: $f(x) = ax^2 + bx + c$
  - vertex: $x = \frac{-b}{2a}$, plug in x to get y.
  - y-intercept = c

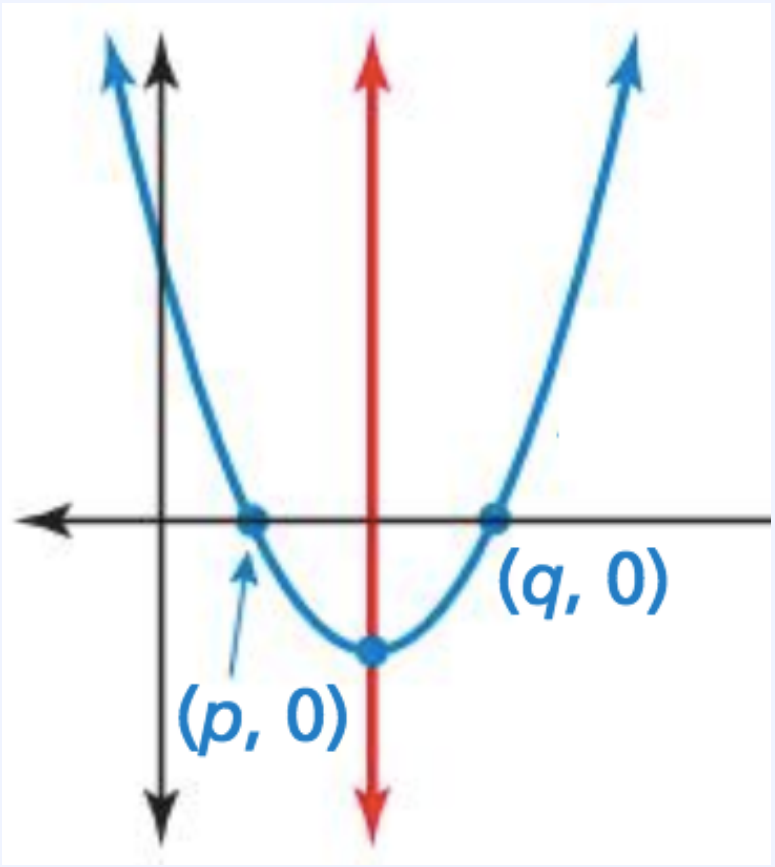
Intercept Form:

$$f(x) = a(x - p)(x - q)$$

Here, p and q are the x-intercepts of the parabola.

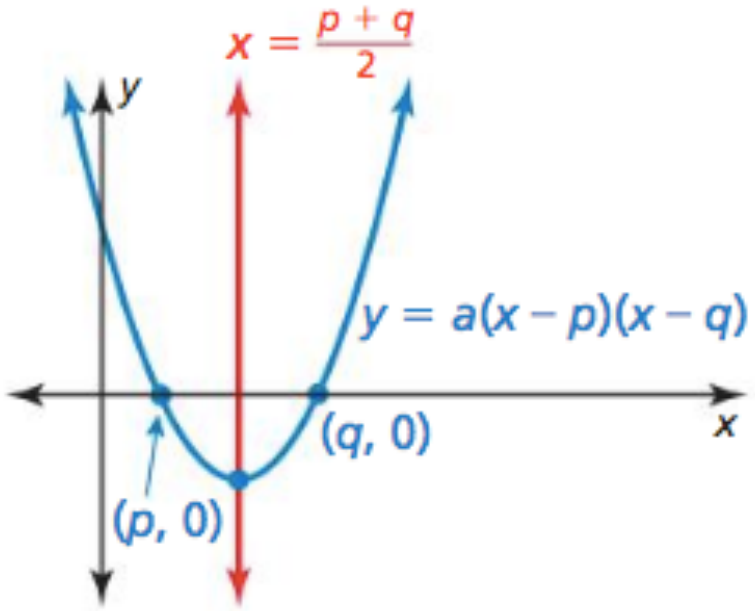
The the axis of symmetry is halfway between p and q, so:

$$x = \frac{p + q}{2}$$



Properties of the Graph of $f(x) = a(x - p)(x - q)$

- Because $f(p) = 0$ and $f(q) = 0$, p and q are the x-intercepts of the graph of the function.
- The axis of symmetry is halfway between $(p, 0)$ and $(q, 0)$. So, the axis of symmetry is $x = \frac{p + q}{2}$.
- The parabola opens up when $a > 0$ and opens down when $a < 0$.



Examples:

1) Graph $f(x) = -2(x+3)(x-1)$. Label the x-intercepts, vertex, and axis of symmetry.

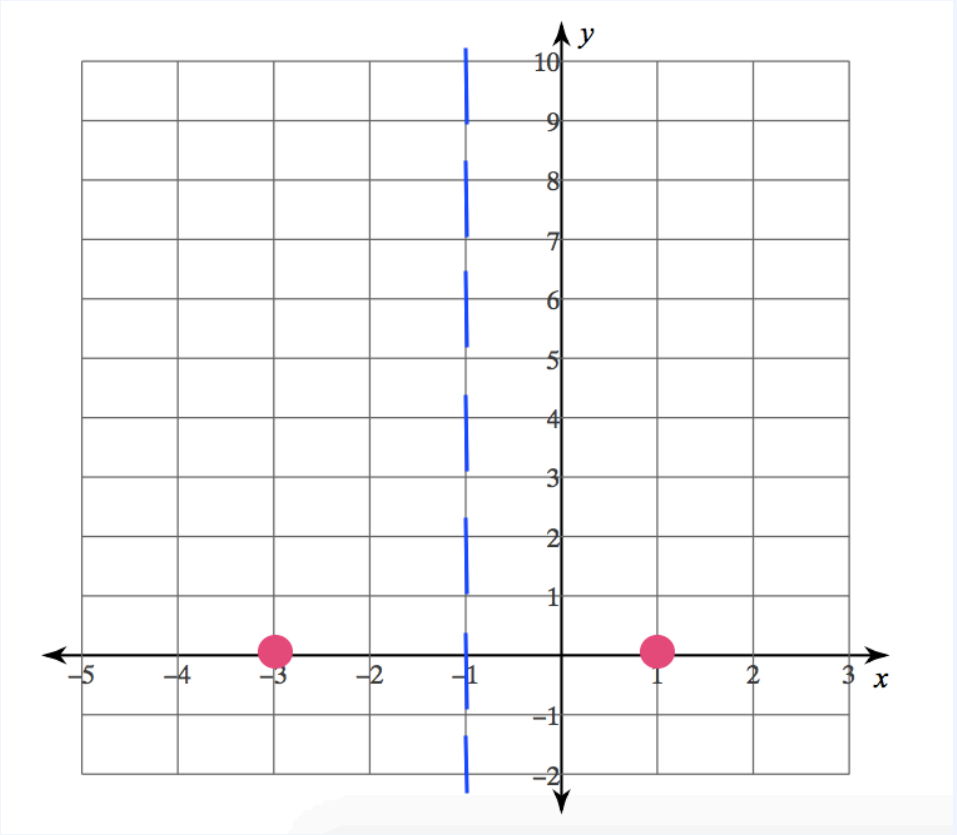
The x-intercepts are: $x = -3$ and $x = 1$

So, the axis of symmetry is:

$$x = \frac{-3+1}{2}$$

$$x = \frac{-2}{2}$$

$$x = -1$$



Examples:

1) Graph $f(x) = -2(x+3)(x-1)$. Label the x-intercepts, vertex, and axis of symmetry.

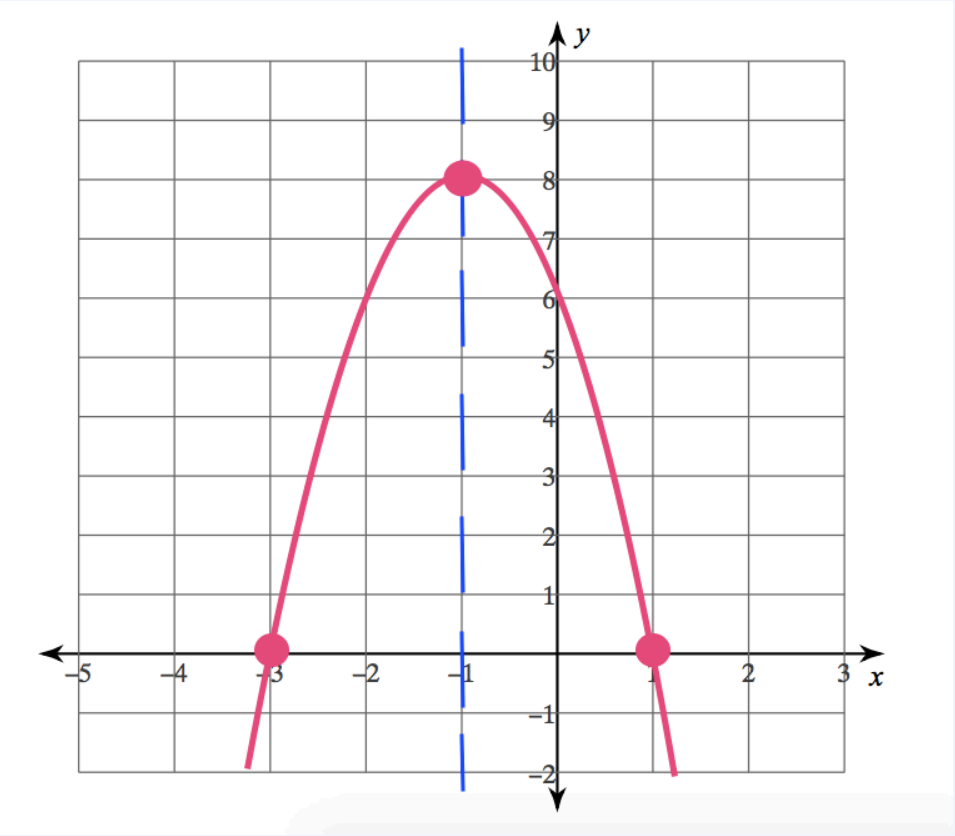
To find the vertex, plug $x = -1$, into the original equation.

$f(-1) = -2(-1+3)(-1-1)$

$f(-1) = -2(2)(-2)$

$f(-1) = -4(-2)$

$f(-1) = 8$ ⟹ Vertex: $(-1, 8)$



Examples:

2) Graph $f(x) = -(x+1)(x+5)$. Label the x-intercepts, vertex, and axis of symmetry.

3) Graph $g(x) = \frac{1}{4}(x-6)(x-2)$. Label the x-intercepts, vertex, and axis of symmetry.

Examples:

2) Graph $f(x) = -(x+1)(x+5)$. Label the x-intercepts, vertex, and axis of symmetry.

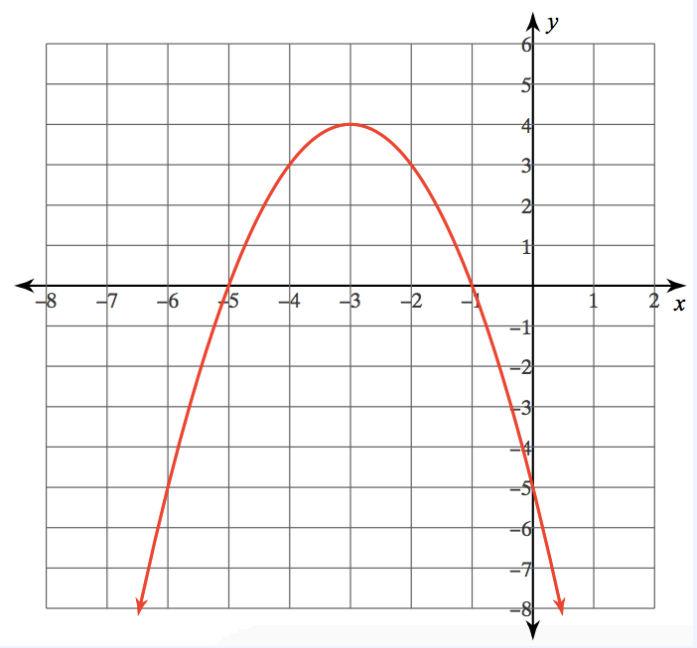
x-intercepts: $x = -1, x = -5$

vertex: $(-3, 4)$

$$f(-3) = -(-3+1)(-3+5)$$
$$= -(-2)(2)$$
$$= (2)(2)$$
$$= 4$$

axis of symmetry: $x = -3$

$$x = \frac{-1 + -5}{2} = \frac{-6}{2} = -3$$



Examples:

3) Graph $g(x) = \frac{1}{4}(x-6)(x-2)$. Label the x-intercepts, vertex, and axis of symmetry.

x-intercepts: $x = 6, x = 2$

axis of symmetry: $x = 4$

$$x = \frac{6+2}{2} = \frac{8}{2} = 4$$

vertex: $(4, -1)$

$$f(4) = \frac{1}{4}(4-6)(4-2)$$
$$= \frac{1}{4}(-2)(2)$$
$$= \left(-\frac{1}{2}\right)(2)$$
$$= -1$$